

CLAIMS

1. A selective oxidation method comprising:

positioning a substrate within a chamber, the substrate comprising first and second different oxidizable materials;

exposing the substrate within the chamber to a gas mixture comprising an oxidizer and a reducer under conditions effective to selectively grow an oxide layer on the first material relative to the second material, the oxidizer oxidizing the first and second materials under the conditions, the reducer reducing oxidized second material under the conditions back to the second material; and

after selectively growing the oxide layer on the first material relative to the second material, reducing partial pressure of the oxidizer and the reducer within the chamber by flowing an inert gas to the chamber while chamber pressure and chamber temperature are at or above those of the conditions during the exposing.

2. The method of claim 1 wherein the first material comprises silicon and the second material comprises a metal in at least one of elemental or alloy forms.

3. The method of claim 1 wherein the oxidizer comprises H_2O .

4. The method of claim 1 wherein the reducer comprises H_2 .
5. The method of claim 1 wherein the oxidizer comprises H_2O , and the reducer comprises H_2 .
6. The method of claim 1 wherein the oxidizer comprises CO_2 .
7. The method of claim 1 wherein the reducer comprises CO .
8. The method of claim 1 wherein the oxidizer comprises CO_2 , and the reducer comprises CO .
9. The method of claim 1 wherein the gas mixture is void of any inert gas immediately prior to said partial pressure reducing.
10. The method of claim 1 wherein the gas mixture comprises inert gas immediately prior to said partial pressure reducing, said partial pressure reducing comprising increasing inert gas flow to the chamber from what it was immediately prior to said partial pressure reducing.
11. The method of claim 1 wherein the conditions comprise rapid thermal processing.

12. The method of claim 1 wherein the conditions comprise a pressure below room ambient pressure.

13. The method of claim 1 wherein the conditions comprise room ambient pressure.

14. The method of claim 1 wherein the conditions comprise pressure greater than room ambient pressure.

15. The method of claim 14 wherein the pressure is no greater than 1.25 times room ambient pressure in Torr.

16. The method of claim 14 wherein the pressure is no greater than 1.21 times room ambient pressure in Torr.

17. The method of claim 1 wherein after the partial pressure reducing by flowing an inert gas, reducing flow of the reducer to the chamber prior to reducing flow of the oxidizer to the chamber.

18. The method of claim 17 wherein flow of the reducer to the chamber is stopped prior to reducing flow of the oxidizer to the chamber.

19. The method of claim 17 wherein flow of the reducer to the chamber is not stopped prior to reducing flow of the oxidizer to the chamber.

20. The method of claim 1 wherein after the partial pressure reducing by flowing an inert gas, reducing flow of the oxidizer to the chamber prior to reducing flow of the reducer to the chamber.

21. The method of claim 20 wherein flow of the oxidizer to the chamber is stopped prior to reducing flow of the reducer to the chamber.

22. The method of claim 20 wherein flow of the oxidizer to the chamber is not stopped prior to reducing flow of the reducer to the chamber.

23. The method of claim 1 wherein after the partial pressure reducing by flowing an inert gas, reducing flow of the oxidizer and the reducer to the chamber simultaneously.

24. The method of claim 1 wherein the conditions comprise pressure greater than room ambient pressure, the method further comprises reducing pressure to below room ambient pressure after said partial pressure reducing.

25. The method of claim 24 comprising reducing flow of the reducer prior to the pressure reducing.

26. The method of claim 25 wherein the flow reducing of the reducer is to zero prior to the pressure reducing.

27. The method of claim 24 comprising reducing flow of the oxidizer prior to the pressure reducing.

28. The method of claim 27 wherein the flow reducing of the oxidizer is to zero prior to the pressure reducing.

29. The method of claim 24 wherein the pressure under the conditions is no greater than 1.25 times room ambient pressure in Torr.

30. The method of claim 1 wherein after the partial pressure reducing by flowing an inert gas, reducing flow of the oxidizer and the reducer to the chamber to zero; and after reducing flow of the oxidizer and the reducer to zero, flowing reducer to the chamber.

31. A selective oxidation method comprising:

positioning a substrate within a chamber, the substrate comprising first and second different oxidizable materials;

exposing the substrate within the chamber to a gas mixture comprising an oxidizer and a reducer under conditions effective to selectively grow an oxide layer on the first material relative to the second material, the oxidizer oxidizing the first and second materials under the conditions, the reducer reducing oxidized second material under the conditions back to the second material, the conditions comprising pressure greater than room ambient pressure;

after selectively growing the oxide layer on the first material relative to the second material, reducing partial pressure of the oxidizer and the reducer within the chamber by flowing an inert gas to the chamber while chamber pressure is greater than room ambient pressure; and

reducing pressure to below room ambient pressure within the chamber after said partial pressure reducing while flowing the reducer and the oxidizer to the chamber.

32. The method of claim 31 wherein the gas mixture is void of any inert gas immediately prior to said partial pressure reducing.

33. The method of claim 31 wherein the gas mixture comprises inert gas immediately prior to said partial pressure reducing, said partial pressure reducing comprising increasing inert gas flow to the chamber from what it was immediately prior to said partial pressure reducing.

34. The method of claim 31 wherein the conditions comprise rapid thermal processing.

35. The method of claim 31 wherein the conditions pressure is no greater than 1.25 times room ambient pressure in Torr.

36. The method of claim 31 wherein the conditions pressure is no greater than 1.21 times room ambient pressure in Torr.

37. The method of claim 31 wherein after the partial pressure reducing by flowing an inert gas, reducing flow of the reducer to the chamber prior to reducing flow of the oxidizer to the chamber.

38. The method of claim 37 wherein flow of the reducer to the chamber is stopped prior to reducing flow of the oxidizer to the chamber.

39. The method of claim 37 wherein flow of the reducer to the chamber is not stopped prior to reducing flow of the oxidizer to the chamber.

40. The method of claim 37 wherein reducing flow of the reducer to the chamber starts prior to reducing chamber pressure to below room ambient pressure.

41. The method of claim 37 wherein reducing flow of the reducer to the chamber starts after reducing chamber pressure to below room ambient pressure.

42. The method of claim 31 wherein after the partial pressure reducing by flowing an inert gas, reducing flow of the oxidizer to the chamber prior to reducing flow of the reducer to the chamber.

43. The method of claim 42 wherein flow of the oxidizer to the chamber is stopped prior to reducing flow of the reducer to the chamber.

44. The method of claim 42 wherein flow of the oxidizer to the chamber is not stopped prior to reducing flow of the reducer to the chamber.

45. The method of claim 42 wherein reducing flow of the oxidizer to the chamber starts prior to reducing chamber pressure to below room ambient pressure.

46. The method of claim 42 wherein reducing flow of the oxidizer to the chamber starts after reducing chamber pressure to below room ambient pressure.

47. The method of claim 31 wherein the oxidizer comprises H_2O .

48. The method of claim 31 wherein the reducer comprises H_2 .

49. The method of claim 31 wherein the oxidizer comprises H_2O , and the reducer comprises H_2 .

50. A transistor fabrication method, comprising:

- forming a transistor gate comprising semiconductive material and conductive metal;
- forming source/drain regions proximate the transistor gate;
- exposing the transistor gate and source/drain regions to a gas mixture comprising H_2O and H_2 within a chamber under conditions effective to oxidize outer surfaces of the source/drain regions; and
- after oxidizing the outer surfaces of the source/drain regions, reducing partial pressure of the H_2O and the H_2 within the chamber by flowing an inert gas to the chamber while chamber pressure and chamber temperature are at or above those of the conditions during the exposing.

51. A transistor fabrication method, comprising:

forming a transistor gate comprising semiconductive material and conductive metal;

forming source/drain regions proximate the transistor gate;

exposing the transistor gate and source/drain regions to a gas mixture comprising H_2O and H_2 within a chamber under conditions effective to oxidize outer surfaces of the source/drain regions, the conditions comprising pressure greater than room ambient pressure; and

after oxidizing the outer surfaces of the source/drain regions, reducing partial pressure of the H_2O and the H_2 within the chamber by flowing an inert gas to the chamber while chamber pressure is greater than room ambient pressure; and

reducing pressure to below room ambient pressure within the chamber after said partial pressure reducing while flowing H_2O and H_2 to the chamber.